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AUTHORITY

ONR ltr, 26 Oct 1977

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FINAL REPORT

Date: 31 May 1954
For period 1 July 1950
through 31 May 1954

CONTRACT: N7-ONR-45506 (With Duke University)

ANNUAL RATE: \$9,123.00 for four year period

Research Assistant: Flora Gorirossi, Junior Instructor, University of Maryland. Engaged on work for the project during the entire period.

Artist: Aline Hansens. \$250.00 (125 hours at \$2.00 per hour)
Collector: A. S. Pearse. \$5.00 (5 hours at \$1.00 per hour)
Collector: Clyde Robertson. \$62.00 (62 hours at \$1.00 per hour)
Collector: H. S. Chapa. \$30.05 (2 weeks at 130 pesos = \$30.05)
Technician: Jane Atkinson. \$21.70 (39 hours at \$.55 per hour)
Typist: Ellen P. Drummond. \$57.00 (57 hours at \$1.00 per hour)

TITLE OF PROJECT: The Comparative Anatomy of the Mouth Parts of Mesostigmatid Mites.

OBJECTIVES: The numerous species of mites that comprise the suborder Mesostigmata were so imperfectly known that their classification, evolutionary trends, and structural adaptations for feeding were largely undetermined. Species included in the group are pests of man and his domestic animals, vectors of disease, parasites, predators, and important components of the fauna of the soil. Knowledge of the comparative anatomy of the mouth parts of these mites has made it possible to explain their adaptations for feeding as well as the evolutionary trends by which these adaptations were attained.

SUMMARY OF RESULTS

In the suborder Mesostigmata twenty-four gnathosomal structures have been named, defined and their homologies established. They are: the gnathosomal base, deutosternum, gnathosomal setae, epistome, tentorium, subcheliceral plate, internal cheliceral sheaths, external cheliceral sheaths, pharynx, tectum, labrum, epipharynx, epipharyngeal styli, hypopharynx, hypopharyngeal processes, hypopharyngeal styli, hypostome, hypostomal setae, hypostomal processes, salivary styli, prosternum, corniculi, chelicerae and pedipalps. All these structures except for the styli are present in each group of the Mesostigmata.

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On the basis of the presence of either or both of the hypopharyngeal and/or the salivary styli, nine of the eleven cohorts considered under the Mesostigmata can be reduced to three groups.

- Group I: Liroaspina-Zerconina-Gamasides
a) only with salivary styli
- Group II: Trachytina-Diarthrophallina-Uropodina
a) with both salivary and hypopharyngeal styli
- Group III: Megisthanina-Celaenopsina-Fedrizziina
a) only with hypopharyngeal styli

Other characteristics of these groups serve to reflect the affinities of the different groups within these three divisions; among these are the structures of the tectum, chelicerae, labrum, and the subcheliceral plate.

Certain adaptive trends which lack phylogenetic significance have also been studied and reported:

1. Scavengers may be modified by having extremely long chelicerae:
 - a. Uropoda agitans (Group II)
2. Predacious forms are usually equipped with heavily sclerotized, strong chelicerae which enable them to crush a chitinous integument:
 - a. Pergamasus sp. (Group I)
 - b. Megisthanus floridanus (Group III)
 - c. Euzercon latus (Group III)
 - d. Polyaspis sp. (Group II)
3. Parasitic forms frequently have slender, stylet-like chelicerae which permit piercing the skin of their hosts:
 - a. Bdellonyssus bacoti (Group I)
 - b. Diarthrophallina quercus (Group II)

A study of certain of the Laelaptidae (belonging to Group II) demonstrated that the epipharynx is greatly enlarged and equipped with a sclerotized groove on its ventral surface. It is freely observable from the ventral surface of the mite. While it has not been observed to function in penetrating its host, it is possible from its structure that it is in a position to penetrate during the process of feeding and inject solutions into the host. It is interesting that Laelaps jettmari Vitzthum, 1930, one of the mites suspected of being involved in the epidemiology of hemorrhagic fever possesses such an epipharynx.

As a result of detailed notes and drawings of the type material found in the Berlese Collection in Florence, Italy, plus information received in conferences held with the leading acarologists in Switzerland, Belgium, England, France and Italy, much information has been disseminated among American acarologists interested in specific mesostigmatid groups.

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A revision of the Mesostigmata has been undertaken in collaboration with Dr. Joseph Camin of the Chicago Academy of Sciences as an outgrowth of the present project, the Berlese study and specimens from the islands of the Pacific, the Indo-Australian Region, South and Central America and other parts of the world. This revision will reflect the fact that only two major phyletic lines are included in the Mesostigmata rather than eleven as was previously thought. Groups I and II of this study are in the same phyletic line. Group III appears to be distinct.

Index of publications as a result of the present study:

Camin, J. and Flora E. Gorirossi.

1954. A revision of the group Mesostigmata. Maha Meetings, Am. Ent. Soc.

Gorirossi, Flora E.

1954. Comparative anatomical studies on the gnathosoma of the mesostigmatid mites. Ph. D. thesis, Department of Zoology, Duke University 113 pp.

The anatomy of the feeding apparatus of Uropoda agitata Banks, 1908, a mesostigmatid mite. Amer. Midl. Nat. in press.

The gnathosoma of the Celaenopsina, (Acarina - Mesostigmata)
Amer. Midl. Nat. in press.

The gnathosoma of Megalaelaps ornata (Acarina - Mesostigmata - Gamasides).
Amer. Midl. Nat. in press.

The anatomy of the gnathosoma of Pergamasus sp. (Acarina- Mesostigmata - Gamasides). Amer. Midl. Nat. in press.

Gorirossi, Flora E. and G. W. Wherton.

1953. The anatomy of the feeding apparatus of Megisthanus floridanus Banks, 1904, a large mesostigmatid mite. Amer. Midl. Nat. 50: 433-447.

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